# THE INSTITUTE OF PHYSICS

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## PHYSICS IN TECHNICAL COLLEGES

## IV — THE NORTHAMPTON POLYTECHNIC, LONDON


By F. Y. POYNTON, M.Sc., F.Inst.P.


### THE POLYTECHNIC

The Northampton Polytechnic is one of the major Colleges of Technology in London and one of the foremost centres of engineering education in the country. It owes its name to the fact that the Marquess of Northampton gave the site—a triangular area of about 1½ acres extent in Clerkenwell. At the outset its purpose was to provide technical education suitable for the workers in the various industries of the immediate neighbourhood and also to serve as a centre for social and recreative activities. The building was opened in 1896 and the fact that the Northampton Institute—as it was then called—was meeting a real need was quickly shown. Within a few years there were some 1,500 students attending classes—mostly in the evening. Quite early two developments took place which in the course of time were to lead to the extension of the Institute in ways unforeseen by its founders and going far beyond the original local function. The first of these occurred in 1900 when, in the reconstruction of London University, the Northampton Polytechnic Institute became associated with it as an Institution having recognised Teachers of the University. The second arose in 1903 when, as the result of the London Education Act, the status of the Polytechnic was fundamentally changed ; it ceased to be a self-contained unit providing merely for local needs and became an element in the comprehensive system of technical education for London. The association with the University permitting students to enter for Internal degrees has played a very great part in the development of the engineering courses, and the extent to which this university work has grown is shown by the fact that in 1952 the number of students graduating from the Polytechnic was 146, which represents a considerable fraction of the total number of Internal engineering degrees awarded by the University. In relation to the London County Council, the Polytechnic has the status of an " aided " Institution with its own Governing Body. This gives it a valuable measure of independence while at the same time ensuring for it the strong financial support of the Council, who regard it in their general plan as a " peak " college, devoted primarily to engineering in all its main branches.

In addition to its main engineering interest, the Polytechnic has flourishing Departments of Ophthalmic Optics and Applied Chemistry. The former has been long established as the largest centre in the country for the training of opticians. The activities of the Applied Chemistry Department include, in particular, fuels, metallurgy, electro-plating and metal finishing. Mention should also be made of the recently established National College of Horology which is housed in the Polytechnic, appropriately so since classes in horology—an industry long associated with Clerkenwell—have been conducted at the Polytechnic since its foundation.

### THE PHYSICS DEPARTMENT

Quite obviously, physics must from the start have formed a very important part of many of the courses and although for several decades the subject, like mathematics, was to some extent catered for sectionally, its early development was mainly associated with that of electrical engineering. Indeed, one of the sections in which the earliest programs were arranged was called " Applied Physics and Electrical Engineering." It was not, however, until 1924 that physics was separately organized when Mr. S. C. Laws succeeded Dr. Walmsley as Principal, and set up a new Department of Physics and Mathematics, which six years later was divided into two distinct departments.

From its formation the function of the Physics Department has been conceived as two-fold :

(i) to act as a service department responsible for providing the basic pure physics needed in the different engineering and other technical courses,

(ii) to develop work in various branches of applied physics both as contributing parts of other courses and as independent activities.

This double purpose has determined the whole development of the department. At no stage has it concerned itself with pure physics degree work, except during the war when it ran emergency courses for two groups of physics bursar students.

Between 1925 and the beginning of the war, the activities of the Polytechnic increased more than three-fold (as measured by student-hours !) and during the greater part of this time the main effort of the Physics Department was absorbed in dealing with the correspondingly great increase in basic physics teaching. Progress on the applied physics side was made but it was hampered by shortage of accommodation and funds. Since the war the increased need for special courses in many branches of applied physics has been fully recognized and the department is now tackling this part of its function as rapidly as accommodation and other difficulties permit.

### STAFF

The department has fourteen full-time members of staff ; Head of Department, three Senior Lecturers, six Lecturers, four Assistant Lecturers. In addition there are some twenty or more part-time Lecturers and demonstrators.

### SURVEY OF ACTIVITIES OF THE DEPARTMENT

The work of the department may be considered conveniently under six headings : Elementary physics ; Post-Intermediate physics ; National Certificates in Applied Physics ; Special evening courses in applied physics ; Short lecture courses ; Industrial testing and research.

(1) *Elementary physics.* A considerable part of the work of the department consists in the provision of classes for the elementary physics required in a wide variety of other courses. The following list gives some idea of the scope of the work.

Intermediate B.Sc.—full-time, evenings, and part-time day.

Ophthalmic Optics—first year of full-time Diploma course.

National College of Horology—first and second year of three year Diploma course.

Ordinary National Certificates (Engineering and Chemistry). All Ordinary National Certificate courses (evening and part-time day) include some physics in at least one year and often more :

Mechanical Aero and Civil Engineering (first year) ; Electrical Engineering (first and second year) ; Engineering production (second and third year) ; Chemistry (first and second year) ; Instrument Technology (all years).

Higher National Certificates (Engineering and Chemistry). A number of Higher National Certificate courses contain some additional physics in one or other year.

City and Guilds of London Institute. Many of the City and Guilds' courses (e.g. Telecommunication engineering, Machine shop engineering, Electrical installations, Metallurgy, etc.), contain physics at some stage.

(2) *Post-Intermediate Physics.* The full-time engineering degree, the ophthalmic optics Diploma and various Higher National Certificate courses all include more advanced work in selected branches of physics and applied physics. For example, the department provides :

(*a*) a physics course throughout the five terms of the full-time Part I B.Sc. (Engineering) course. The general purpose of this course is to extend the study of basic physics beyond the Intermediate level in selected directions and to cover certain specific parts of the degree syllabus. The course deals with : thermodynamics ; elementary kinetic theory and equations of state ; fluid flow and viscometry, surface phenomena, friction and lubrication ; vibrations and wave motion ; optical interference and its applications in metrology, polarisation, spectroscopy ;

*Fig. 1. High Vacuum Laboratory. General view.*

illumination, fundamentals of photometry, lighting design and calculations, light sources; introduction to atomic theory and discharge through gases; elements of electronics.

(*b*) an electronics course for students taking the electronics paper in Part 2 of the engineering degree course. The Physics Department co-operates with the Electrical Engineering Department in the teaching of this subject. The physics course is concerned with the physics of electron tubes; gaseous discharges; electron ballistics; electron-phenomena in solids, thermionic emission, photoelecticity, semi-conductors, barrier layer cells and rectifiers; particle accelerators; vacuum technique.

(*c*) a telecommunications physics course covering certain sections, e.g. acoustics and electromagnetic field theory, of the final degree course.

(*d*) a course on physics of metals and other engineering materials, and non-destructive methods of testing, for the fourth year mechanical engineering degree students.

(*e*) a course in illumination for the third year of the ophthalmic optics Diploma course.

(*f*) a two-year course on optical instruments for the Higher National Certificate course in Instrument Technology.

(3) *National Certificates in Applied Physics and Graduateship of the Institute of Physics.* Part-time day and evening courses for the Ordinary and Higher National Certificates in Applied physics are in operation. For the Higher National Certificates the applied physics section is at the moment devoted to electronics and vacuum technology. Classes are also arranged for the additional physics needed for the Graduateship examination of the Institute.

*Fig. 2. High Vacuum Laboratory. General view of the pumping stations.*

(4) *Evening Courses in Applied Physics.* These courses are not, in general, directed towards any particular examination, but are intended simply to assist those who, having already an adequate general knowledge of physics, wish to obtain some help in the special field of applied physics in which they are working. All the courses occupy at least one evening per week for a full session and wherever it is appropriate practical laboroatory work is provided. With regard to the latter we have done our best to ensure that really adequate equipment is available and much time and trouble have been spent in developing suitable practical work. In the devising and the carrying out of these courses we have received great help from industrial experts and we are very grateful indeed for their enthusiastic support.

The following brief notes will give some indication of this work.

(*a*) *Electronics.* A two-year course—the first year is devoted to a general introduction, the second to selected special topics. The majority of the students are engineers or physicists with a degree or Higher National Certificate but in each year a separate class has been arranged specially for workers in biological fields, where there is a great increase in the use of electronic apparatus. (These courses were developed by Mr. Philip Parker, F.Inst.P., whose death last year while climbing in the Alps robbed us of a brilliant colleague and friend.)

(*b*) *Vacuum technology.* A full-session course of two evenings a week, one devoted to lectures and the other to practical work. The last twelve lectures are devoted to special industrial applications and are given by visiting experts.

(*c*) *Applied X-rays.* Three distinct courses each dealing with one of the main divisions of the field :

(i) X-ray technology. A two-year course for those engaged in the manufacture, installation, and maintenance of X-ray equipment.

(ii) X-ray diffraction. A one-year course covering the fundamental techniques of X-ray diffraction with special emphasis on industrial applications.

(iii) Industrial radiography. A one-year course covering the general principles and practice of X and gamma radiography.

(*d*) *Applied acoustics.* An advanced course on applied acoustics has been conducted every year—except the war years—since the early thirties. It is designed for physicists and engineers specialising in acoustical engineering.

(*e*) *Industrial spectroscopy.* For the last three sessions courses have been given covering the general principles, instrumentation and techniques of industrial spectroscopy.

(*f*) *Illumination.* Courses in illuminating engineering for the City and Guilds' examinations have been run—again apart from the war years—since the inception of the examinations.

(*g*) *Electromagnetic field theory.* This course of lectures is intended primarily for physicists and engineers interested in microwave work and has been given every year since the war.

(5) *Short lecture courses.* Each session one or more short courses of lectures have been arranged on recent developments in some subject of topical interest, e.g. the measurement of temperature, magnetic materials, magnetic amplifiers, survey of microwave instrumentation, wave guide propagation and measurement of impedance, the electron microscope and its applications.

All these have attracted large numbers of students, mainly from industrial and academic research laboratories.

## LABORATORY ACCOMMODATION AND EQUIPMENT

The department has at present eight laboratories, together with a lecture preparation room, a photographic dark-room, a small workshop, and a small room for the electron microscope, giving a total area of approximately 7,300 square feet. A major rebuilding and extension work is now in progress at the Polytechnic and when this is completed we shall have three additional laboratories, bringing the total floor spacing up to approximately 8,500 square feet.

*Fig. 3. Corner of the Applied X-ray Laboratory.*

As the following notes indicate, the laboratories are very well equipped not only with standard "manufacturers'" equipment but also with a considerable amount of apparatus specially designed by the staff and constructed either in the department or in the engineering workshops. Until about five years ago the department had no workshop of its own and though we have always been, and still are, quite specially fortunate in the help and co-operation we have received from our engineering colleagues in this respect, the possession of a departmental workshop has greatly facilitated the development of the laboratories, particularly as we have had several laboratory technicians of outstanding capability.

*Elementary laboratories.* The three large elementary laboratories call for no special comment.

*Electronics and advanced electrical laboratory.* The electronics and advanced electrical laboratory is primarily devoted to electronics but is also equipped for more advanced electrical measurements. It is well provided with the usual oscillators, cathode-ray oscillographs, amplifiers, power-packs, etc., and in addition, a noteworthy amount of apparatus constructed in the laboratory for special experiments and demonstrations.

*Advanced acoustics and optics laboratory.* The advanced acoustics equipment includes a 7ft. anechoic chamber (constructed in 1935), magnetic tape recorder, sound level meter, high speed level recorder, filters, wave-analyser, and a representative selection of loudspeakers and microphones.

On the optics side, the laboratory is well provided for experimental work on optical instruments, interferometry and its applications in metrology, photo-elasticity, and spectroscopy. Particular items of interest are a large and a medium quartz spectograph, an N.P.L. type interferometer for absolute gauge measurement (home-made), photoelastic polariscopes of both the lens and diffused light types (both home made).

*Photometric laboratory.* The chief items of equipment are two photometric benches (made in our Instrument Department workshops), a 3ft. integrating sphere, a large and small integrating cube, photo-electric polar curve photometer (home made), various types of illumination meter.

*Vacuum laboratory.* The vacuum laboratory was begun in 1948 and much effort has been devoted to its development. The main items of equipment are five pumping stations, each with backing and diffusion pumps and gauges, a large evaporation and sputtering plant, a mobile eddy-current heater, vacuum and hydrogen furnaces, a spot welder, glass working equipment—including a lathe and small sealing-in machine, a valve pumping unit with baking oven, measuring equipment, etc.

A considerable range of experimental work has already been developed and a large proportion of the equipment has been designed and constructed in the laboratory, including the valve pumping plant and a new small evaporation unit. A fuller account of the laboratory has been given in *Vacuum*, Vol. 1, No. 2 (published by Edwards & Co. Ltd.).

*Applied X-ray laboratory.* The applied X-ray laboratory was started in 1949. It has an area of 700 square feet and a part of it is separated off by a protective wall for use as a radiography room. It is well equipped for industrial radiography and technical diffraction (mostly powder) work, and much time has been given to the development of suitable practical exercises in both these fields, and again much of the equipment is home made.

The equipment includes a 220 KV industrial radiographic unit (constructed from component parts obtained from various sources), three Watson Mobilix X-ray units, 2 H.T. units with sealed-off diffraction tubes, a Raymax crystallographic unit, various powder and single crystal cameras, A.S.T.M. Index, ionisation meter.

## RESEARCH

Until recently very little research was done in the department, but in the last few years there has been a considerable improvement in this respect. Several members of the staff are pursuing their own researches in various fields (visual after-images, flow of gas through tubes, Xero-radiography) and three papers have been published recently. In addition, a number of investigations have been carried out for industrial firms, e.g. production techniques for electrodeless gas-discharge tubes, design of biological electronic equipment, various applications of vacuum evaporation. In this connection, particular mention may be made of the electron microscope, which was installed in the department three years ago. Numerous investigations with this have already been carried out in collaboration with firms and other organizations: for example, form and size of zinc oxide particles in relation to production methods, shapes, size and growth of particles in vanadium pentoxide sol, fibrous character of nucleo-proteins, wear in diamond powders, study of the surface of diamond tools.

The number of sponsored investigations of this kind is growing and we welcome this development as it undoubtedly represents a very important way in which a technical college can assist industry and, moreover, such collaboration is a considerable stimulus within the Polytechnic.

The above account has been restricted to a description of the existing state of affairs both as regards activities and accommodation, but, in conclusion a glance ahead may be permitted. The major extension and rebuilding operation now in progress at the Polytechnic which will give the Physics Department three additional laboratories, will allow us to have separate applied acoustics and optics laboratories and to extend the space for electron-microscopy and research. Furthermore, the Polytechnic is now introducing a modified form of its full-time Engineering Diploma and it is proposed that one branch in which this may be taken shall be "Engineering Physics." We hope and believe that some students may find in this an attractive curriculum more suited to these aims and interests than the usual engineering or physics courses.

## NEWS OF MEMBERS

### Fellows

C. B. ALLSOPP has been appointed Professor of Physics at Guy's Hospital Medical School.

PROFESSOR SIR LAWRENCE BRAGG has been appointed Fullerian Professor of Chemistry and Director of the Davy-Faraday Laboratory in the Royal Institution of Great Britain.

J. A. CLEGG will take up an appointment as Lecturer in Physics, at Imperial College of Science and Technology, London, on October 1, 1953.

PROFESSOR F. E. HACKETT has retired from the Professorship of Physics and Electrical Engineering at University College, Dublin.

PROFESSOR WILLIS JACKSON has been elected a Fellow of the Royal Society.

N. PENTLAND has been appointed Head of the Physics Department, Brighton Technical College.

G. O. STEPHENS is now Principal of North-East Essex Technical College, Colchester.

PROFESSOR W. SUCKSMITH has been awarded the Duddell Medal of the Physical Society.

L. C. TYTE has been appointed Director of the Central Research Establishment II of the National Coal Board at Isleworth.

J. YARWOOD has been appointed Head of the Department of Mathematics and Physics at The Polytechnic, Regent Street, London.

### Associates

W. W. H. CLARKE has been appointed a Defence Research Service Officer with the Canadian Defence Research Board, Ottawa.

P. DENTON is now Senior Technician in the Film Sensitizing Department, Kodak Ltd., Wealdstone, Harrow, Middlesex.

A. G. GAYDON has been elected a Fellow of the Royal Society.

J. L. HOWARTH has been appointed Head of the Radiation Physics Department at the Lovelace Foundation for Medical Education and Research, Albuquerque, New Mexico, U.S.A.

J. F. KENDALL is now on the staff of the Research Laboratory of British Thomson-Houston Co. Ltd., Rugby.

L. N. D. LUCAS is a Lecturer in Physics at the University of Western Australia.

R. W. NICHOLLS has been appointed Assistant Professor of Physics at the University of Western Ontario, Canada.

J. H. SHAYLOR has been appointed Departmental Manager, The General Electric Co. Ltd., Wembley, Middlesex.

S. W. THORNE is shortly taking up an appointment as a Senior Scientific Officer, Department of Air, Melbourne, Australia.

### Graduates

P. F. BURDEN has been appointed Development Engineer at Ferranti Ltd., Manchester.

A. E. HORSFIELD has been appointed a Research Officer with the British Boot, Shoe and Allied Trades Research Association, Kettering, Northamptonshire.

S. E. ORCHARD is now working as Technical Officer at Imperial Chemical Industries Ltd., Dyestuffs Division, Manchester.

D. T. TURNBULL is now an Assistant in the Department of Natural Philosophy at the University of Aberdeen.

N. W. WOOTTEN has been appointed an Established Experimental Officer at the Chemical Defence Experimental Establishment, Ministry of Supply, Porton Down, Wiltshire.

## BOOK REVIEW

**General Properties of Matter.** By C. J. SMITH, M.Sc., Ph.D., A.R.C.S., F.Inst.P. (London : Edward Arnold & Co.) Pp. vii + 580. Price 50s.

C. J. Smith's *Intermediate Physics* is so well known that there is little need to introduce the author of the volume under review, the first of a series in preparation by him. The standard and content of the book are mainly those required for the University of London General B.Sc. degree which, it should be remembered, is an Honours degree. The historical approach is retained and the emphasis is on basic principles and on the fundamental and well established methods and techniques even at the expense, sometimes, of the omission of more important modern developments. The author has had to make a choice and his choice is to limit himself to the requirements set by the examination syllabuses of the various universities. Indeed, it would be correct to say that the textbook is more suitable for the examination candidate rather than for the earnest student of physics. There are excellent sets of examples, many taken from London University examination papers and mainly numerical, at the end of each chapter, and several worked examples are included in the text, so that the user may not only obtain the necessary information for answering the questions but also practice at answering them.

The volume consists of thirteen chapters. The first four, which constitute about one sixth of the total volume, are mainly mathematical. The first, entitled "Mathematical Introduction," deals with vectors, Fourier analysis, the solution of first and second order differential equations and a brief reference to partial differential equations. The general principles of particle dynamics and of rigid dynamics form the subjects of the next two chapters and the final chapter in this group is on simple harmonic motion. The next eight chapters are concerned with the usual topics included in a course on general properties of matter, the intensity of gravity, gravitation, elasticity, the bending of beams and spiral springs, compressibility, surface tension, solid and liquid flow, and the Brownian movement, osmosis and diffusion. The final chapter, in which an account is given of vacuum practice, does not quite fit into the general scheme and might well have been omitted or included as an appendix.

The chapters dealing with gravity and gravitation are very good, though it is hard to see why the modern Hartley gravimeter is mentioned but the Eotvo balance is omitted, and why Heyl's method for the measurement of the gravitational constant is entirely ignored. For the drop-weight method of determination of surface tension the author, following N. K. Adam, wisely advocates the use of tables but is not the table given on page 390 the incorrect one ? It is a pleasure to see Bernoulli's theorem dealt with in more detail than usual and a separate section devoted to non-Newtonian liquids, though the section in the same chapter on crystals might well be somewhat pruned. The excellent line diagrams and the inclusion in the volume of descriptions of numerous experiments which it is obvious the author has performed or developed himself are also praiseworthy features.

However, leaving aside minor criticisms of content and treatment of particular topics, the reviewer is compelled to direct attention to some general features, which in his opinion, considerably mar what otherwise would be an excellent textbook. The book is far too comprehensive. A student could not possibly assimilate its contents, together with similar

amounts of optics, heat, electricity and atomic physics, in a two-year course, and the author does not assist the student in any way to make an appropriate selection. The student, therefore, is warned that, except for reference purposes, he should not use this textbook without advice and careful supervision.

In the various mathematical and theoretical derivations there is a tendency to oversimplify the argument and to play down to the student. Consequently the derivations are somewhat laboured and divided into too many small steps. Indeed, in some places the discussion could quite easily be shortened and put more concisely without any loss of clarity. In addition, there are marked variations, from section to section, in style and expression, as if the author, having written these sections at different times, failed to revise the whole by reading them through again together. Several examples of verbosity and lack of the use of "plain words" are also to be found. These are common faults to which men of science are very prone, but there are several excellent ways of detecting them. One good way is to read the text aloud.

S. WEINTROUB.

## THE REGISTER

ELECTIONS TO MEMBERSHIP

An asterisk (*) indicates transfer from another grade.

*Fellows*

Barber, Cecil Robert, B.Sc., Principal Scientific Officer, National Physical Laboratory, Teddington.

*Broadhurst, John Weston, B.Sc., A.R.C.S., Division Instrument Manager, Imperial Chemical Industries Ltd., Runcorn.

Chaudhri, Rafi Mohammed, M.Sc., Ph.D., Professor of Physics and Dean, Faculty of Science, Government College, Lahore.

Gillies, Alastair Watson, B.Sc., Ph.D., Senior Lecturer, Northampton Polytechnic, London.

*Guthrie, John Charles, M.Sc., Senior Physicist, Courtaulds Ltd., Manchester.

*Haine, Michael Edward, M.Sc., Section Leader, Research Laboratory, Associated Electrical Industries Ltd., Aldermaston.

*Holmes, Stephen, B.Sc., Ph.D., Senior Physicist and Deputy Research Manager, Turner Brothers Asbestos Co. Ltd., Rochdale.

Nitka, Heinz Friedrich, Dr. phil.nat., Scientific Officer, Imperial Chemical Industries Ltd., Manchester.

Stanworth, John Edwin, M.Sc., Head of Materials and Physics Sections, British Thomson Houston Co. Ltd., Rugby.

*Associates*

Allen, Norman Leader, B.Sc., Ph.D., Postdoctorate Research Fellow, National Research Council of Canada, Ottawa.

Bird, Albert John, B.Sc., Physicist, Paint Research Station, Teddington.

*Blackie, John, B.Sc., Research Student, King's College, Newcastle-upon-Tyne.

Brodlie, James, B.Sc., Principal Science Teacher, Falkirk Technical Senior Secondary School.

Butler, George Fawcett, B.Sc., Senior Science Master, The Gateway School for Boys, Leicester.

Camfield, Gordon James, M.A., Senior Scientific Officer, Royal Aircraft Establishment, Farnborough.

Campbell, William Francis, B.Sc., Physics Lecturer, Whitehaven Technical Institute.

*Cattrell, Victor Gordon, M.A., Scientific Officer, Fighting Vehicles Research and Development Establishment, Ministry of Supply, Cobham, Surrey.

*Cunningham, Kenneth William, B.Sc., Senior Electronic Engineer, The Plessey Co. Ltd., Ilford.

Davies, Louis Walter, B.Sc., D.Phil., Research Officer, C.S.I.R.O., Chippendale, Australia.

Fulop, Walter, B.Sc., Research Assistant, College of Technology, Birmingham.

Hamilton, Robert John, B.Sc., Scientist, National Coal Board, Stoke Orchard.

*Horsley, Robert Alfred, B.Sc., Research Physicist, B.X. Plastics Ltd., Manningtree, Essex.

*McCue, Clarence Gordon, M.Sc., Scientific Officer, Department of Supply, Australia. (Temporarily at Radio Research Station, Slough, Bucks.)

*Middlehurst, Jack, M.Sc., Research Officer, C.S.I.R.O., Chippendale, Australia.

*Owen, Gwilym Eilian, B.Sc., Research Physicist, Monsanto Chemicals Ltd., Ruabon.

*Peckover, Peter Albert, B.Sc., Assistant Lecturer in Physics, Aston Technical College, Birmingham.

*Rae, Alexander, B.Sc., Senior Scientific Officer, Wool Industries Research Association, Galashiels.

Ramanathan, Natesan, M.Sc., Ph.D., Senior Lecturer in Textile Physics, Victoria Jubilee Technical Institute, Bombay.

*Rhoden, Frank, B.Sc., Scientific Officer, Admiralty Compass Observatory, Slough.

Roberts, James Alfred, M.Sc., Ph.D., Research Officer, C.S.I.R.O., Chippendale, Australia.

Temple, Sidney, B.Sc., Head of Science Department, Loughborough College School.

*Wilkinson, Donald, B.Sc., Research Officer, G.K.N. Group Services Ltd., Birmingham.

Willis, Bertram Terence Martin, B.A., Ph.D., Research Physicist, Research Laboratories, General Electric Co. Ltd., Wembley.

*Graduates*

*Bailey, Myra, M.A., Technical Officer, Imperial Chemical Industries Ltd., Manchester.

Bean, Leonard William, B.Sc., Experimental Staff, Research Laboratories, The General Electric Co. Ltd., Wembley.

*Billington, Ernest William, B.Sc., Research Student, University College, Hull.

*Cole, Colin George, B.Sc., Research Student, University of Western Australia.

*Colwill, William, B.Sc., Technical Officer, Paints Division, Imperial Chemical Industries Ltd., Slough.

Cooper, David John, B.Sc., Assistant Physics Master, Dudley Grammar School.

*Falconer, Robert Leslie, B.Sc., Demonstrator in Physics, University of Queensland, Australia.

Farmer, Anthony Arthur, B.Sc., Technical Assistant, Division of Atomic Energy, Ministry of Supply, Warrington.

Fearn, Ronald Wilfred, B.Sc., Research Physicist, British Celanese Co. Ltd., Derby.

*Fisher, Peter, B.Sc., Research Student, University of Western Australia.

Garnham, Alan, B.Sc., Postgraduate student, University of Durham.

Gidley, John Arthur Frederick, B.Sc., Technical Officer, Metals Division, Imperial Chemical Industries Ltd., Birmingham.

Hughes, Thomas Peter, B.Sc., Scientific Officer, Forest Products Research Laboratory, D.S.I.R., Princes Risborough.

*Keam, Donald Wilfred, M.Sc., Scientific Officer, Foundry and Welding Metallurgy Section, Defence Research Laboratory, Department of Supply, Australia.

*Lancaster, John Alfred, B.Sc., Junior Engineer, Marconi's Wireless Telegraph Co. Ltd., Chelmsford.

MacKenzie, Leslie Alan, B.Sc., Assistant Physicist, Christie Hospital and Holt Radium Institute, Manchester.

*Maslen, Victor William, B.Sc., Research Student, University of Western Australia.

*Mitchell, Lynn Raymond, B.Sc., Meteorologist, Department of Interior, Commonwealth Public Service, Adelaide, Australia.
Moon, Bruce Alex McGeorge, M.Sc., Scientific Officer, Department of Supply (Australian), London.
Payne, Arthur Robert, B.Sc., Research Technical Officer, Research Association of British Rubber Manufacturers, Croydon.
Rees, Norman John Morgan, B.Sc., Research Student, University College of Wales, Aberystwyth.
Robinson, William Gaythwaite Harcourt, B.Sc., Assistant Master, Davenant Foundation Grammar School for Boys, London.
Som, Asok Kumar, M.Sc., Engineer Trainee, Everett, Edgcumbe & Co. Ltd., London.
Sweetman, Donald Roy, B.Sc., Research Student, University of Birmingham.
Venables, Joan, B.Sc., Research Assistant, British Coal Utilisation Research Association, Leatherhead.
White, Maurice William, B.Sc., Assistant Lecturer, Physics Department, Coventry Technical College.

*Subscribers*

*Allan, George Wood, Student, University of Durham.
Barnes, Ian Mack, Assistant Radiographer, De Havilland Propellers Ltd.
Bowen, Richard Wells, Engineering Assistant, Research Department, Railway Executive, Ashford.
Bullen, Graham John, B.Sc., Research Student, Northern Polytechnic, London.
*Burnell, James Douglas, B.Sc., Senior Electrical Engineer, Brian Colquhoun & Partners, Rhodesia.
Jenkins, Barbara Elizabeth Clarence, Experimental Officer, Royal Aircraft Establishment, Farnborough.
Gard, John Alan, Electron Microscopist, University of Aberdeen.
Price, William John, B.Sc., Spectrographer, Magnesium Elektron Ltd., Manchester.
Priestley, Eric Francis, Senior Experimental Officer, Ministry of Supply.
*Simpson, Arthur, Technical Assistant, British Paper and Board Industry Research Association.

*Students*

Bartlett, Charles Richard Oldfeld, University of Bristol.
Hanscomb, John Robert, University of Queensland, Australia.
Hindley, Tony Kenneth Derrick, Derby Technical College.
Hood, Peter Jonathan, The Polytechnic, Regent Street, London.
Howell, Bernard, Rotherham Technical College.
Jordan, Brian Jerrold, The Polytechnic, Regent Street, London.
Kalman, Peter, The Polytechnic, Regent Street, London.
Kaye, William Greenwood, Bradford Technical College.
Law, Lewis Arthur, University of Birmingham.
Lim, Yung Kuo, University of Melbourne, Australia.
Lowe, John Malcolm, University of St. Andrews.
Marsden, Phillip Leonard, College of Technology, Birmingham.
Macaulay, Ian James, University of Melbourne, Australia.
McGilvray, James Peter, University of Queensland, Australia.
Pennington, Geoffrey Alan, College of Technology, Birmingham.
Schur, Herbert, Birkbeck College, London.
Singleton, Donald George, University of Queensland, Australia.
Tybulewicz, Albin, The Polytechnic, Regent Street, London.

## APPOINTMENTS VACANT

**The inclusion of particulars of a vacancy must not be taken to imply that the Institute necessarily approves of the terms offered or that might be offered. Candidates should satisfy themselves that these are satisfactory, and they may always refer to the Institute for advice.**

### SCIENTISTS

**The British Boot, Shoe and Allied Trades Research Association** require a young **Physicist** for work on (*a*) footwear production and wear problems ; (*b*) shoe materials and other products used in the industry. Duties : laboratory testing (including work on new methods), also practical research and development on materials and processes. Recent graduates considered, but some industrial laboratory experience in a related field (e.g. leather, rubber plastics or adhesives) will justify a higher starting salary up to £700 p.a. Salary reviewed annually, F.S.S.U. Applications to Director, B.B.S.A.T.R.A., Satra House, Rockingham Road, Kettering, Northants.

A **Physicist** who has recently graduated or who expects to graduate this year is required by the Research Laboratory for development work. Candidates should have a bias towards production problems and experience of low vacuum work would be an advantage. Salary according to qualifications and experience. Applications stating age and complete details of qualifications and experience should be addressed to Personnel Manager, **Triplex Safety Glass Co. Ltd.,** Birmingham 30.

An **experienced physicist** with good Honours degree is required at the Research Laboratories of **The General Electric Co. Ltd.,** North Wembley, Middlesex, to work on problems of valve design and applications. A good knowledge of theoretical physics applied in particular to electron-optics, interaction of electrons and H.F. fields and electron produced noise is required. This is an attractive vacancy on the Scientific Staff for a graduate with at least three years research experience. Apply to the Staff Manager (Ref. RLO/973), stating age, qualifications and experience.

**The Institution of Electrical Engineers,** Savoy Place, London, W.C.2. Applications invited for post of an **Assistant Editor** for *Science Abstracts*. The duties will mainly consist of the selection and editing of abstracts and assistance in the preparation of the subject index. Salary according to age and experience.

Applicants should have either a good degree in physics, preferably with Honours, or a qualification in electrical engineering which would give exemption from Sections A and B of the Institution's Examination. Experience in an academic laboratory or an industrial research department desirable. Familiarity with the literature of physics and/or electrical engineering, and a wide interest in current developments are essential, together with a capacity for concise expression and orderly arrangement. Some acquaintance with a foreign language or two, and interest in foreign publications is essential.

**Valve Engineers** required for an expanding Production Unit in Scotland which is making special valves and gas-filled tubes for radar. Applicants must have design or production experience under one of the following headings :—

Thermionic Valves, Radar Equipment,
Microwave Valves, Microwave Measuring Equipment.
Gas-filled Tubes,

The positions to be filled are :—
*Senior Engineer.*—Salary £1,000–£1,500 per annum according to experience and ability. An Honours degree in physics or engineering is essential, and applicants must have held previously a position of responsibility ;
*Junior Engineers.*—Salary range £500–£1,000 per annum according to experience and qualifications.

These positions offer full scope for initiative and progress. Contributory pension scheme in operation. When applying,

giving full details of qualifications and experience in chronological order, quoting reference V.E. to Box No. 942B, McCallum Advertising, 21 Castle Street, Edinburgh 2.

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**British Industrial Solvents,** Hull, are seeking an **Instrumentation Engineer** to organise the maintenance of all instruments in their factory and to advise on installation and use of instruments in chemical plant. Age 30/35 years. Applicants should have a degree in chemistry, chemical engineering or in engineering and must have a knowledge of chemical plant instrumentation. Salary would depend on qualifications and experience. Apply : Staff Manager, The Distillers Co. Ltd., 21 St. James's Square, London, S.W.1.

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A **Graduate** with a 1st class Honours degree in a scientific subject or mathematics for training for the production staff. The work involved is to investigate problems, at all stages of manufacture, of chemical, physical and general natures and to recommend both standards and methods for manufacture. A real interest in production problems both technical and general is essential. Age up to 30 years. The salary will be upwards of £500 according to age, qualifications and experience. Applicants should state present salary and quote Ref. No. M.5 to the Personnel Officer, **British Cellophane Ltd.,** Bath Road, Bridgwater, Somerset.

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**Electronic instruments technical salesman** required for South Africa ; should have a sound knowledge of basic physical principles, preferably with university degree and an interest in nucleonics. The successful applicant will receive training at the A.E.R.E. Harwell. Initial contract three years. Suitable salary and travelling expenses. Applications should be addressed to Box No. A.V.39, The Institute of Physics, 47 Belgrave Square, London, S.W.1.

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**Physicist** required for development and application of radioactive tracer techniques to rubber and plastics. Good degree required, but previous experience with radioactive materials not essential. Applicants graduating this year will be considered. Applications in writing, quoting reference J.M.12 to the Personnel Manager, **Dunlop Rubber Co. Ltd.,** Fort Dunlop, Erdington, Birmingham 24.

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**The Medical Research Council** have vacancies for **physicists** or **electrical engineers** at their Radiobiological Research Unit, Atomic Energy Research Establishment, Harwell, Nr. Didcot, Berks. The projects involved are :

(I) Adaptation of nuclear reactor for irradiation of animals by fast neutrons, thermal neutrons or gamma rays ;
(II) Development of ion sources and target assemblies for high voltage accelerator used to produce neutrons ;
(III) Study of some physical problems arising in ionisation chamber method for measuring fast neutron dose ;
(IV) Study of some physical problems arising in the irradiation of lungs of animals by radioactive dust particles. Experience in the production and analysis of aerosols would be an advantage ;
(V) Dosimetry of gamma rays and beta rays, including applications of radiation chemistry to high intensity measurements ;
(VI) Study of the physical processes of interaction of high energy protons and neutrons from the Harwell cyclotron with light elements in relation to biological effects in tissue. Experience with nuclear research plates would be an advantage.

Salary : Comparable to that paid by universities.
Superannuation : F.S.S.U.
Terms of Appointment : Three years (unless candidate is senior man), possibility of permanent post after initial three years.

Applications (with names of two referees) to, and further details from, Director of Unit.

## TECHNICIANS

**University College of the Gold Coast,** Department of Physics. Applications are invited for the appointment of an **Electronics Technician** in the science workshops. Some experience of instrument making is required. The appointment will be on a five year contract in the first instance. Salary £800 p.a. plus a gratuity of £100 p.a. in lieu of superannuation provision. Part furnished residential accommodation at rent of not more than 10 per cent of salary will be provided. Family allowances of £50 per child (up to a maximum of £150) if children are resident in the Gold Coast or £100 per child (up to a maximum of £300) if children are resident elsewhere. Free first-class passages will be provided for the selected candidate and his family on assumption and relinquishment of the appointment and for annual leave of eight weeks in the United Kingdom. Outfit and baggage allowances are paid on first appointment.

The duties will include the construction, maintenance and repair of electrical equipment, the training of staff and responsibility for electronic components stores.

Applications (six copies) with the names of three referees, should be sent to the Assistant Registrar (London), University College of the Gold Coast, 29 Tavistock Square, W.C.1, from whom further particulars may be obtained. Closing date : June 30, 1953.

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**The British Boot, Shoe and Allied Trades Research Association** require experienced physics **laboratory technician** (non-graduate) for varied experimental and materials testing work. Male or female. Specialized knowledge of shoes and shoe materials is not expected. Age preferably 20–28. Permanent and progressive post qualifying for pension scheme. Applications, which should indicate the starting salary required, to Director, Satra House, Kettering.

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**Electronic instruments service mechanic** required for South Africa ; should have a thorough practical knowledge of scalers, power units, etc., as used in nucleonics. Experience at the A.E.R.E. very desirable. Initial contract three years. Suitable salary and travelling expenses. Applications should be addressed to Box No. A.V.40, The Institute of Physics, 47 Belgrave Square, London, S.W.1.

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Monmouthshire Education Committee, **Technical College of Monmouthshire,** Crumlin, require a **Laboratory Technician** as soon as possible at the above College. Candidates should possess a good practical knowledge of one or more of the following Crafts, viz. :—

Scientific Glass-Blowing, Instrument or Apparatus Repair,
Carpentry, Preparation of Metallurgical
Photographic Processing, Specimens.

Possession of an appropriate City and Guilds or National Certificate desirable. Experience as a Laboratory Assistant or Steward would be an added qualification. Salary £405 x £5 to £420. Forms of application obtainable from the Director of Education, County Hall, Newport, Monmouthshire, and should be returned not later than July 1, 1953.

## COURSES

### ROYAL TECHNICAL COLLEGE, SALFORD

*Principal :* P. F. R. VENABLES, Ph.D., F.R.I.C.

**Department of Pure and Applied Physics**
**Session 1953–54**

Full-time Courses for External Degrees of London University.
Part-time Courses for Degrees ; Ordinary and Higher National Certificates in Applied Physics.
Full-time and part-time Courses for Associateship of the College and Grad.Inst.P.
Post Advanced Courses.
Autumn Term—Rheology.
Spring Term —Physical principles of electronic instruments in laboratory measurement and process control.

*Prospectus available in July 1953 from the Head of Department.*

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